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ABSTRACT

This paper reports on an experimental study whose principal purpose was to determine the effect of social reinforcement and no social reinforcement as used with two formats of material (programed and non-programed instruction) to: (1) gain knowledge about the use of radio in Extension teaching; and (2) improve performance in radio broadcasting. The second purpose was to determine: (1) when and where professional staff study self-instructional materials in on-the-job situations; and (2) their attitude toward independent study methods. Thirty two University of Wisconsin Extension Community Program Staff were randomly assigned to four treatment groups. Two received programed instruction units, and two non-programed instruction units. Positive social reinforcement was given to half of them through verbal communication and telephone calls. A knowledge test administered two weeks after the staff completed the use of the material showed that there were no significant differences in the resulting knowledge of test scores or in gains in radio broadcast performance. (author/pt)

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THE EFFECT OF SOCIAL REINFORCEMENT WITH PROGRAMMED AND NON-PROGRAMMED INSTRUCTION IN IN-SERVICE INDEPENDENT STUDY BY NEWLY EMPLOYED UNIVERSITY EXTENSION STAFF

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INTRODUCTION

This paper reports an experimental research study which compared the effects of instructional format and social reinforcement in independent study relative to: 1) knowledge of professional staff about the use of radio in Extension teaching; and 2) gains of professional staff in performance in radio broadcasts.

A basic assumption that can be made relative to Community Programs' professional staff in University of Wisconsin Extension is that in-service training is desirable to enable staff to improve their performance and carry out their responsibilities more effectively. Unique to providing in-service training for a group of professionals is the fact that they are not geographically located so that they can readily be drawn together for a "traditional classroom teaching" situation. Rather, they are located in each of the 72 counties in Wisconsin. Independent or self-instructional study is being ~~indicated~~ initiated as a means to provide in-service training to them.

In implementing these new instructional means it was believed to be essential to systematically examine the means to: 1) determine if they would, in fact, help the learner acquire knowledge and use that knowledge to perform his job better; and 2) ascertain when and where staff read and study the materials in on-the-job situations and assess the receptiveness of staff to the specific instructional means used. Intelligent decisions can then be made relative to continued use of the instructional means or of modification of them.

The self-instructional formats used in this experimental research were programmed (8) and non-programmed (3) units of Make Radio Work For You, designed to teach staff about the use of radio in Extension teaching. Two demonstrational tapes were a part of each unit. Positive social reinforcement was administered to evaluate its effect on the independent study.

For this research, positive social reinforcement is defined as social stimuli such as verbal communication and attention that will convey to the subject approval and acceptance of himself as a person. It was not to threaten the subject in any way, but to specifically reinforce and encourage the behavior of reading and studying the self-instructional materials.

HYPOTHESES

Two major concerns dealt with in this study were: 1) knowledge test scores of newly hired University Extension staff in the use of radio in Extension teaching, and 2) gains in performance in radio broadcasts of newly hired University Extension staff.

For each of these concerns three hypotheses were tested (making a total of six hypotheses) using the planned comparison technique. The hypotheses were:

1) There is no difference in the effects of reinforcement with programmed and non-programmed instruction.
2. There is no difference in the effects of format with and without reinforcement.
3. There are no interaction effects between format and reinforcement.

No hypotheses were formulated relative to when and where staff read and studied the materials or of the receptiveness of staff to the independent study methods.

BACKGROUND AND REVIEW OF RESEARCH

A review of research relative to programmed instruction with adults shows that little of such research has been done. Authorities in the instructional field are in agreement that students can learn from programmed instruction but some question how well they learn from programmed instruction in contrast to other kinds of instruction.

Two studies (5, 7) report comparing use of the programmed unit Make Radio Work For You with a workshop method to teach the same content. One found programmed instruction more effective than the workshop while the other found programmed instruction as effective as the workshop.

Contradictory evidence exists concerning the effectiveness of self-instructional materials written in programmed versus non-programmed format. Pressey (6) "opened the door" for research comparing programmed and non-programmed format of the same material when he reported he found no significant difference in learning between the two. Some researchers found similar results, others found the programmed format significantly superior to the non-programmed, while others found the non-programmed format significantly superior to the programmed.

One cannot help but be impressed by the obvious absence of reported research of the use of social reinforcement in education, and more specifically, in adult education. Most research relative to social reinforcement deals with adult reinforcement of children's behavior. Only one study (1) was found that reported the use of social reinforcement in education (a college psychology class). On objective tests, those receiving social reinforcement performed significantly better than those not receiving it.

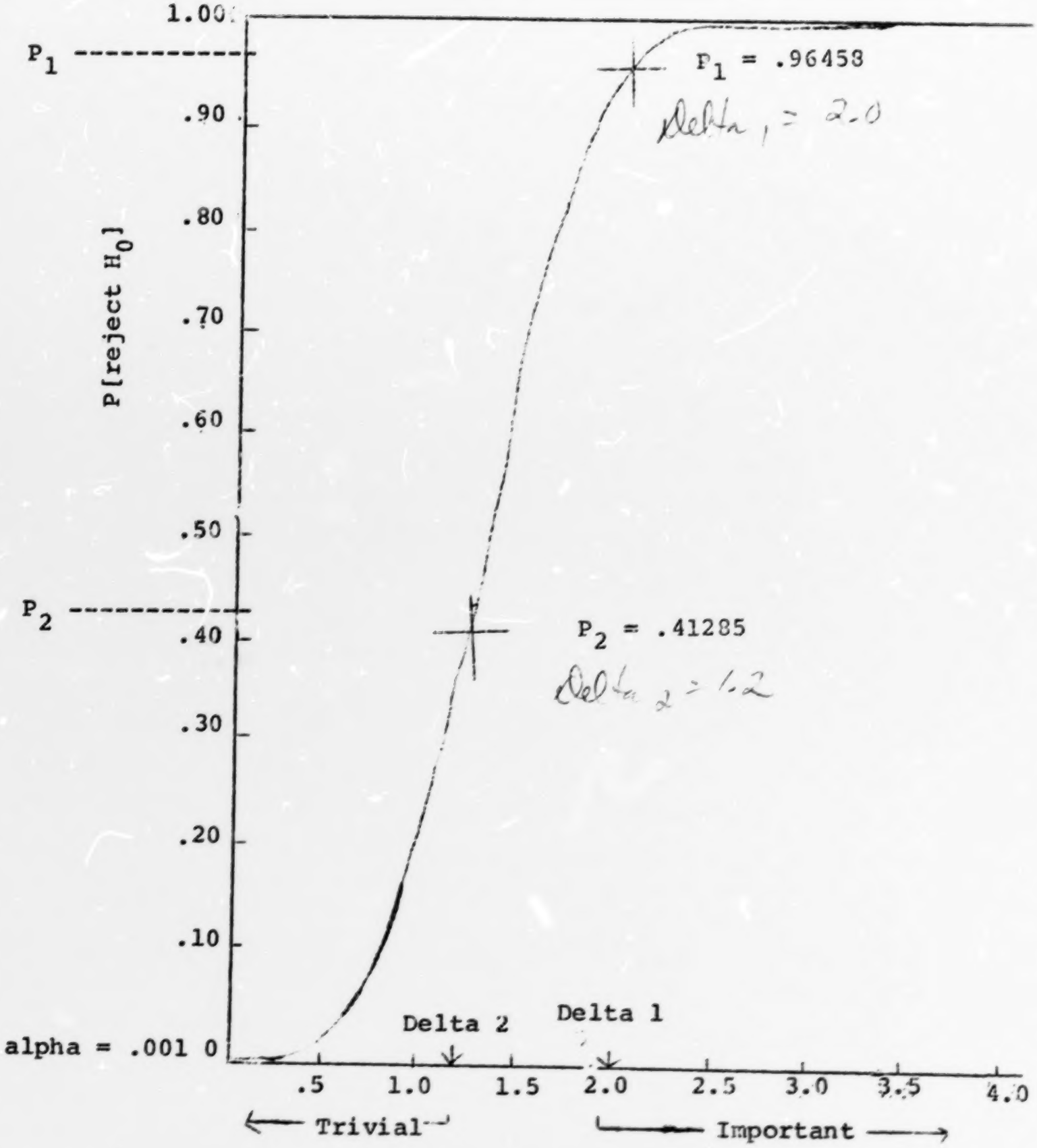
SAMPLE AND METHODOLOGY

A 2 X 2 factorial experimental research design was used. The population was 32 University Extension Community Programs staff with two years and seven months or less experience who met the criteria of making two radio broadcasts a month (or a minimum of 24 per year). They were randomly assigned to four treatment groups (eight per cell): two groups receiving programmed and two groups receiving non-programmed formats; one group of each format type receiving positive social reinforcement. In the review of research, a criticism of reported research relative to both programmed instruction and social reinforcement was that most research was done in an experimental laboratory setting and proved

to be workable only under laboratory conditions. This experiment was conducted in as "normal" a situation as possible for independent self-instructional in-service training of Extension staff to avoid introduction of Hawthorne effect or having it become a laboratory experiment.

A new procedure developed in the Laboratory of Experimental Design (Department of Educational Psychology, University of Wisconsin) was used to simultaneously determine sample size and alpha level for this study (4). The procedure involves defining: 1) important and trivial differences to be considered; and 2) bounds for probability of rejection in each of these regions. The researcher is forced to clearly specify the decision of greater interest to him. He can then more intelligently and accurately access the power of the tests he will use to test hypotheses and thus correctly identify important and trivial differences in the data. This results in decision-making for future action relative to in-service training in this case being more rational than when the researcher merely selects the traditional .01 or .05 Type I Error-rate to test hypotheses. The diagram on page 6 indicates: 1) the important and trivial differences (standard deviations) in learning selected; and 2) the probability for rejection in each of these regions. The alpha level is established by the resulting power curve of these two fixed points. An alpha of .001 and sample size of eight per cell resulted.

During the two weeks in which the staff used and studied the self-instructional materials on the job in their respective county offices, positive social reinforcement was administered to half of them through verbal communication and attention transmitted via three telephone calls on a variable interval schedule. The main purpose of each call was to let the subject know that the caller (social reinforcing agent) was: 1) interested; 2) sympathetic; and 3) inquiring if she could do anything to help. A running log was kept of each phone conversation (of as much as was possible).



POWER CURVE FOR STATISTICAL TEST OF HYPOTHESES

Each subject selected and submitted two tapes of radio broadcasts regarded by him among his "best" -- one made prior to his use and study of the materials and another after use and study of the materials.

Two weeks after the subjects completed use and study of the self-instructional materials, a knowledge test was administered (sent to them). Mean scores were computed by treatment groups.

A radio performance evaluation instrument was used to evaluate the "before" and "after" tapes by three experts listening to the tapes at the same time. The difference in mean scores by treatment groups were computed to determine gains in performance.

A brief questionnaire was used to collect data from the subjects relative to: 1) When and where they read and studied the self-instructional materials; 2) their reaction to this type of independent study; and 3) their reaction to each of the phone calls (sent only to those receiving calls). Response to the questions on the questionnaire were summed by relevant categories to report and interpret the finding.

The technique of planned comparisons, a variation of the ordinary analysis of variance and F test was used to test the six hypotheses. For this study, the hypothesis relative to the effects of social reinforcement was regarded as of greater importance and was tested last at an alpha of .001 (the alpha determined by the previously described procedure).

The hypothesis relative to interaction effects was regarded as of lesser importance to the researcher and tested first at an alpha of .0001. The hypothesis concerning the effects of format was regarded as being of intermediate importance (between reinforcement effects and interaction effects) and tested second at an alpha of .0001.

The strength of the planned comparisons statistical test lies in the fact the comparisons are statistically independent (because of the orthogonal comparisons) and permit the researcher to obtain "unrelated, non-overlapping pieces of information about his experiment" (2).

RESULTS

None of the statistical tests were significant and the researcher failed to reject any of the hypotheses. Effects of no positive social reinforcement were present, but they were not regarded by the researcher as producing a difference in mean scores in level of knowledge large enough to reject the hypothesis. A standard deviation of 1.1, in fact, was found, but since the researcher chose to regard 1.2 standard deviations or less as trivial, the observed difference is not significant at alpha of .001. At an alpha of .005, it would have been a borderline case (required F value of 9.34 at alpha = .005, and the observed F value is 9.39). At alpha levels of .01 (required F value of 7.08) and .05 (required F value of 5.63) the hypothesis very likely would have been rejected in favor of the alternate hypothesis indicating that effects of no positive social reinforcement were present.

Responses of subjects relative to their reaction to the phone calls indicated that eight of the sixteen receiving the calls regarded the first call as reinforcing. Three regarded the second call as reinforcing and only one regarded the third call as reinforcing. The other responses indicated feelings of : threat; indifference; questioning of the necessity of the call; or a combination of reinforcement and threat, and/or questioning of the necessity of the call. The number not responding to the question relative to their reaction to each phone call increased from one on the first call to three on the second call to five on the third call.

Reaction of the subjects to the independent self-instructional methods used was generally positive with 23 of 30 respondents indicating they would like more in-service training using this method in the future. Three indicated they did not want any more like it.

IMPLICATIONS

The review of literature caused the researcher to anticipate that the groups receiving positive social reinforcement might score higher on the knowledge test than the groups not receiving it. However, the researcher did not expect the difference to be statistically significant and chose to test null hypotheses. The fact that the groups not receiving the reinforcement scored higher on the knowledge test should be considered with the findings that the number of subjects receiving the phone calls who regarded the calls as clearly reinforcing decreased from eight of sixteen on the first call to one of sixteen on the third call. Implications here are that the treatment of positive social reinforcement was not powerful enough to produce an effect on the knowledge test scores or, in fact, was not reinforcement. The researcher concludes there is an obvious implication for further investigation of the use of social reinforcement in educational activities of adults to determine its maximum potential for increasing the effectiveness of such education.

LIMITATIONS, STRENGTHS AND FRUSTRATIONS OF THE RESEARCH

Limitations:

1) A major limitation of this research is the absence of a ~~central~~ control group to which no treatment would have been given. It was considered, but because there was too small a population from which to draw a control group without raising the years of experience of subjects in University Extension to three years or more, it was not done. Use of a pre-test to measure gains in knowledge was also considered, but the fact that the test, itself, would teach knowledge about the use of radio in Extension teaching (thereby reducing accuracy of measurement of effects of treatment), caused the researcher to decide not to use it.

2) A second major limitation of the research concerns the administration of the social reinforcement treatment. The treatment was either not powerful enough to affect learning or it was not, in fact, positive social reinforcement as it was intended to be.

3) The researcher regards as a weakness of the study the fact that a longer period of time after use and study of the self-instructional materials (perhaps even a longitudinal study) was not built into the design to more fairly and accurately evaluate improvement in performance in radio broadcasts. The model and rationale for the study is based on the theory that: from the treatment knowledge is acquired; a period of time elapses for practice and application of that knowledge; and improvement in performance of the skills involving use of that knowledge results. The "after" tapes were made within the month following completion of use and study of the materials. This may not have been an adequate or fair amount of time to expect improvement in performance in skills to occur. On the other hand, unless continued effort is made to improve performance of skills, a longer period of time does not necessarily lead to improvement in performance of skills.

4) The instrument used to evaluate the tapes of radio broadcasts should be given further consideration for future research. The total instrument consists of four sections. To not destroy the independence of statistical tests for the planned comparisons, the total score of subjects for the total instrument was used. It might be beneficial, however, to be able to evaluate performance of specific types of skills in relation to the independent study methods used to teach knowledge involving those skills to determine if certain types of skills can, in fact, be improved more readily by the independent study methods than other types of skills. The researcher believes the instrument would need further refinement to do this.

Strengths:

1) The overall experimental research design used in this study is generally regarded as a strong point of the research.

2) Not conducting the research in an experimental laboratory situation, but rather, in a realistic setting for independent self-instructional in-service training is regarded as a strength of this research.

3) A third strength of this research is the comparison of a relatively large unit of both programmed and non-programmed material as contrasted to previously reported research in this respect. For example, in the Pressey study a programmed set of 1110 words was converted to six paragraphs of 360 words in non-programmed format. In this study, the programmed unit of 142 pages with approximately 22,750 words was converted to 80 pages of approximately 17,325 words in non-programmed format.

4) The researcher considers the procedure used to simultaneously determine sample size and alpha level for the decision-making use relative to future in-service training of University staff a definite strength of this research.

5) The planned comparisons technique used to test the hypotheses in this study is regarded by the researcher as a strenth.

Frustrations:

1) Perhaps the most challenging and frustrating (but necessary and essential) experience for the researcher was the process of choosing the trivial and important differences with the accompanying power levels to simultaneously determine sample size and alpha level. Such basic questions as "How does one effectively measure 'learning'?" and "Does a score of 95 on a test really mean that individual has learned significantly more than another who scored 85?" arose. It was necessary for the researcher to think this through to select the differences that were to be considered important and trivial in the study. Experiences such as this are recognized by the researcher as necessary, important processes in conducting research.

2) The researcher was very frustrated while involved in the procedure of simultaneously selecting sample size and alpha level since no printed material describing and discussing the procedure was available. It was to be presented at the AERA meeting in

in Los Angeles and not released for publication prior to that time. Not being a "professional statistitian," the researcher had a difficult time comprehending the total procedure and found it even more difficult not to have printed material for reference purposes.

3) Being a "technician" in operating various tape recorders for the sessions in which the three experts evaluated the "before" and after tapes was also frustrating. It is remarkable how adept one involved in research becomes at doing such things.

4) Frustrating experiences were also had in administering the positive social reinforcement via the three telephone calls. One subject sent a card informing the researcher she wouldn't be in the office the day agreed upon for the second call and that she saw no need for a call since she didn't have any questions. However, so that the subject wasn't "lost" from the research because of not receiving all the calls, the researcher called the subjects' office to inquire of the secretary if the subject would be in the following day. To the suprise of both the researcher and subject, the subject wasn't "out of the office" at all, the call was completed and the mission was accomplished!

Another subject informed the researcher upon completion of studying the materials that he would be in Brazil in a short time. Fortunately, the researcher was able to "track him down" in Texas as he was enroute to Brazil and have him complete the knowledge test and attitude-toward-the-method questionnaire. Mission accomplished again!

Still another subject informed the researcher on the first call that the entire unit had been studied and there was no need to call again to offer help. The researcher did some fast thinking to contrive valid reasons for making a second call, and again, at the time of the second call, to schedule a third call to the subject. Involving the subject in thinking through quite carefully how the unit was helpful to him, how it could be improved and what other things could be done with independent self-instructional in-service training of this type kept him "turned on." Mission accomplished again!

It is very evident that when one is conducting research that involves direct contact with subjects, one is dealing with a very exciting but frustrating (at times) experience. The reward comes with the satisfactions one experiences as the data begins arriving and at least that part of the research can be considered a success!

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